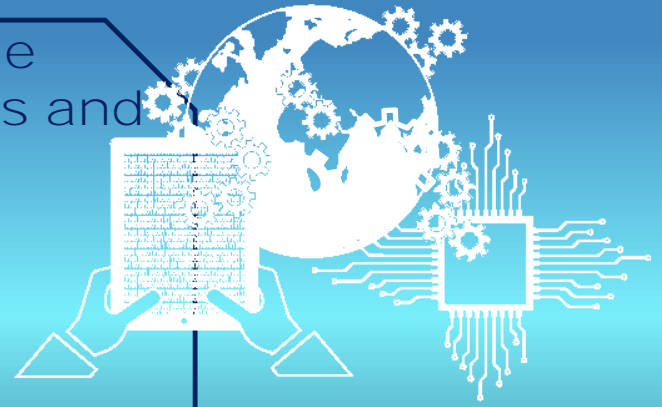


On the deep nature of human knowledge (part I): Neuroscience, quantum physics and the imaginary - a day in the life of an engineer

Gerhard Luhn, PhD, SYSTEMA GmbH
Germar Schneider, PhD, Infineon Technologies Dresden
Gerald Hüther, PhD, Academy for the Exploration of Human
Potentials





1. Where everything started - what is wrong w/ determinism?
2. On the deepness of knowledge and imagination – OMB system part I
3. A day in a life of an engineer
4. Conclusions part I

“The imaginary is not a different stream but constitutive of the normal flow of life.”

Francisco Varela



Francisco Varela (1946 – 2001),
Chilean neuroscientist



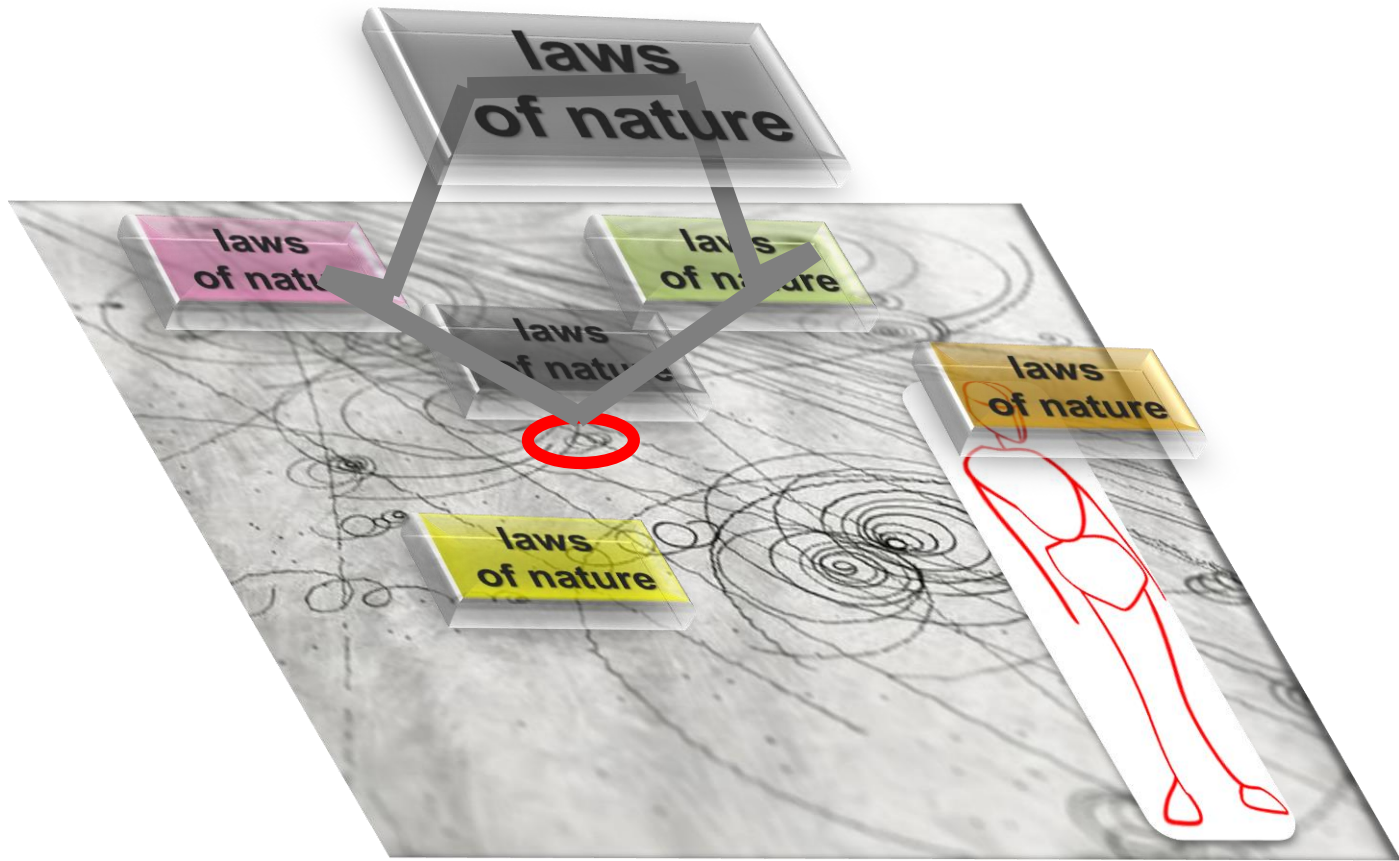
Gerald Hüther (*1951),
German neuroscientist (co-author)
<http://www.gerald-huether.de/>



Marvin Lee Minsky (1923 – 2016)
American cognitive scientist

1. Where everything started



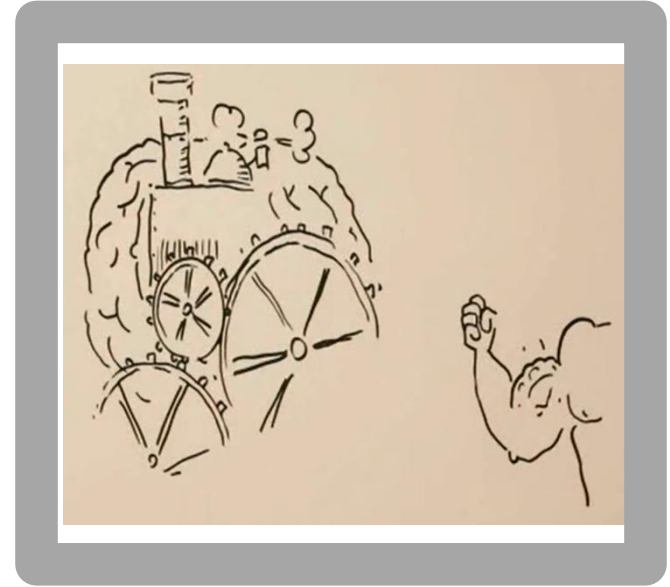


2. On the deepness of knowledge and imagination

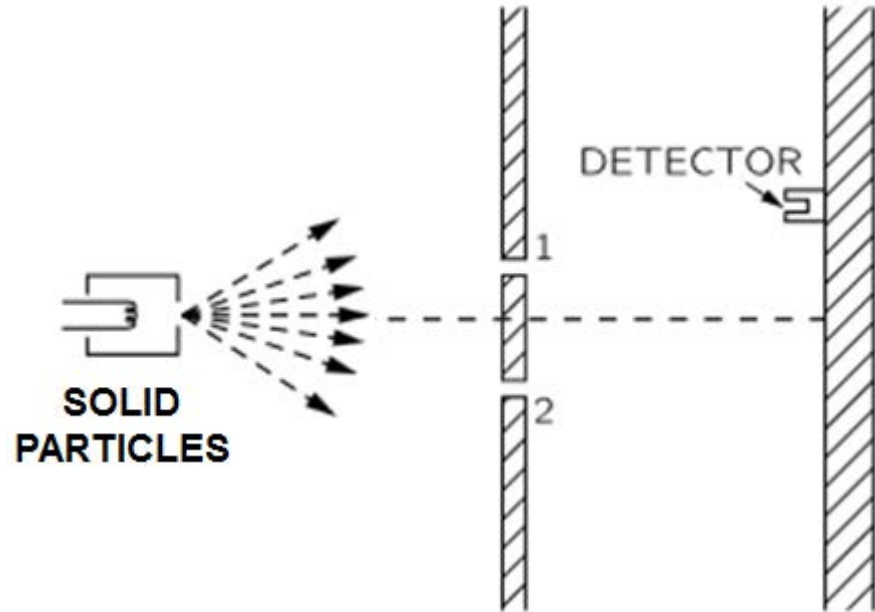
"You cannot teach a person anything.

You can only help him find it within her-/ himself."

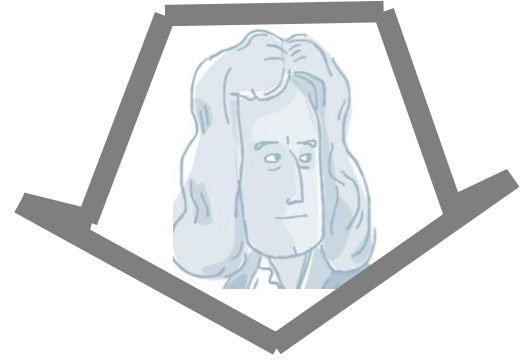
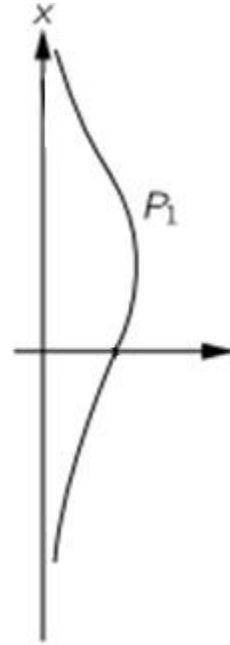
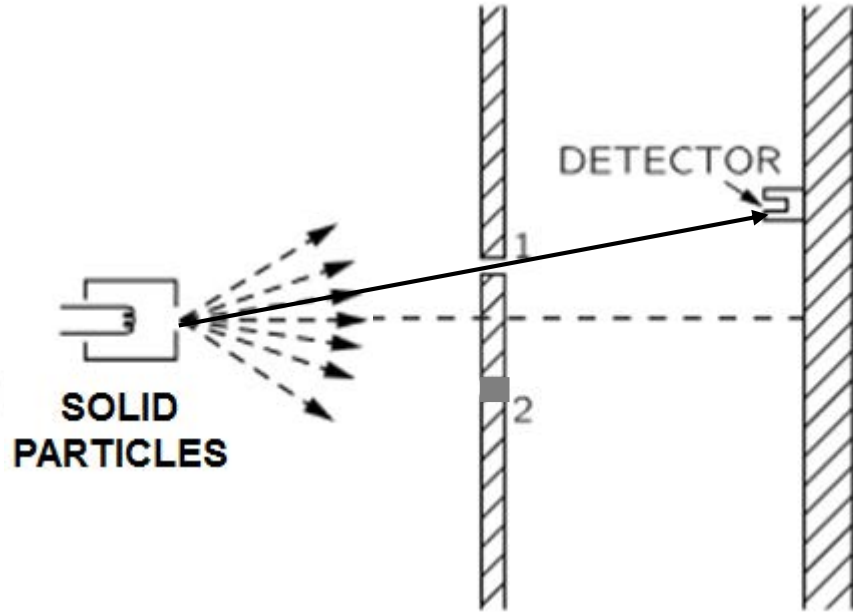
(Galileo Galilei, 1564 - 1642)



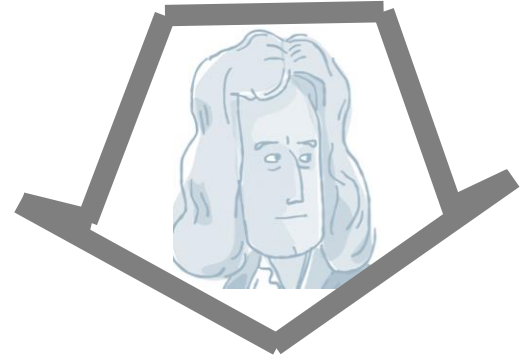
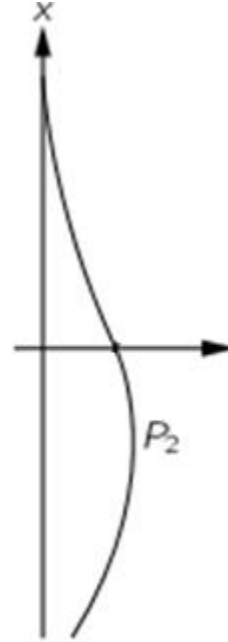
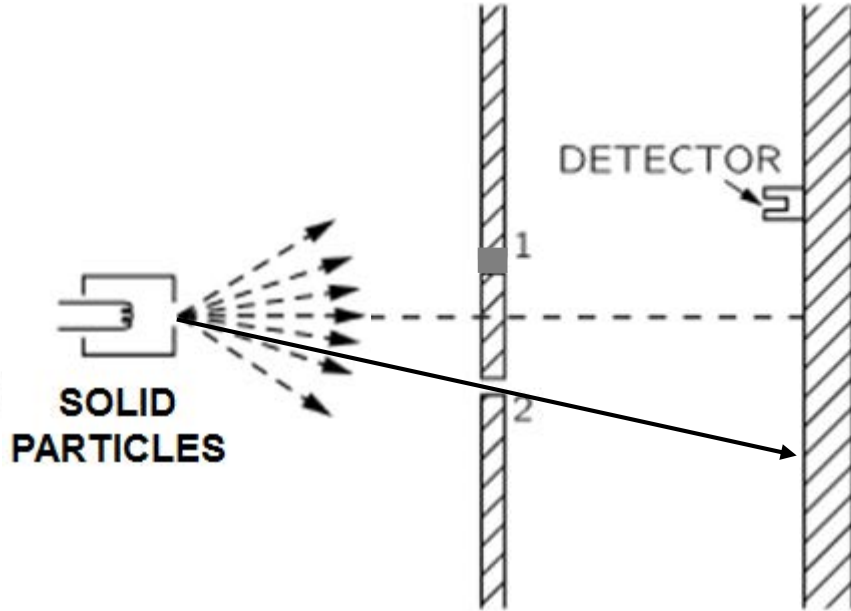
train your brain!
teach neural nets!
(the deterministic view)

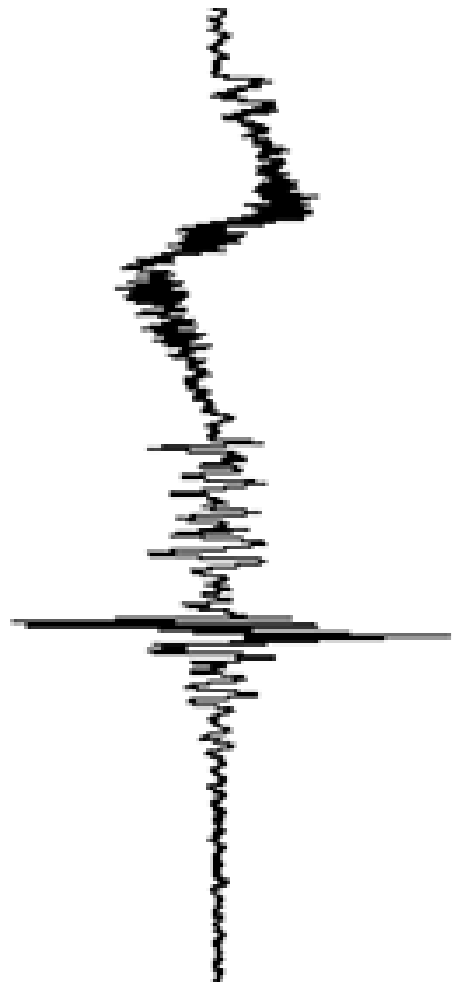
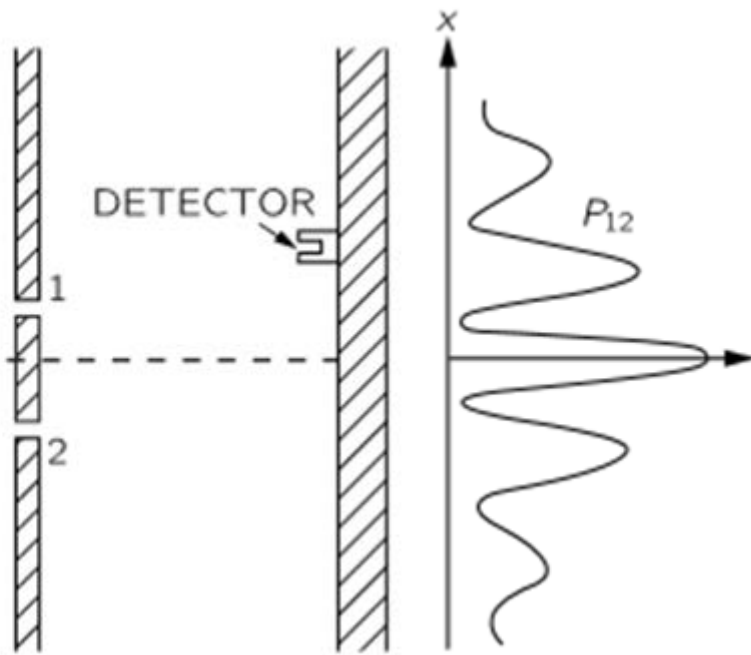
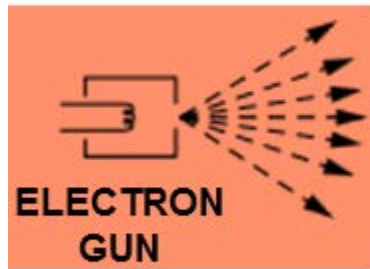


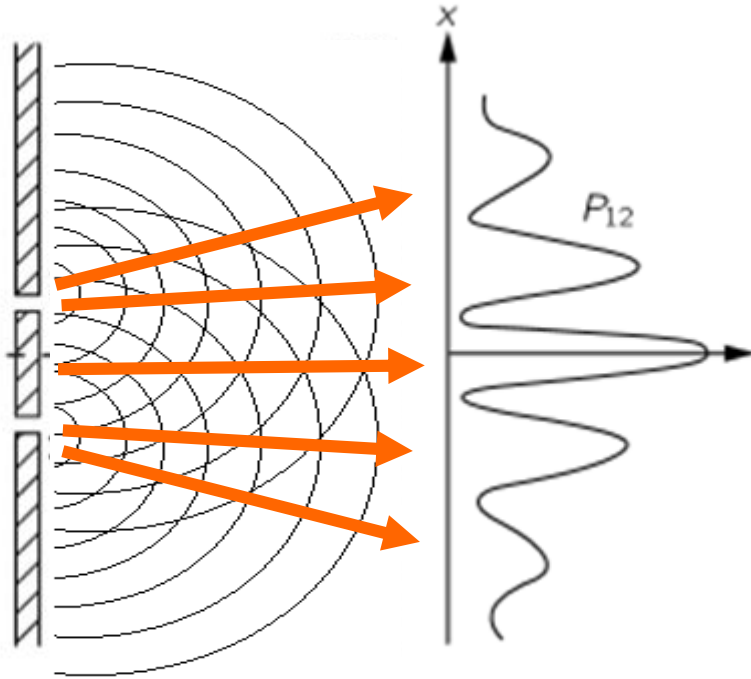
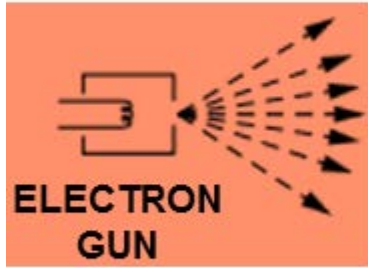
„Newtons world“



„Newtons world“

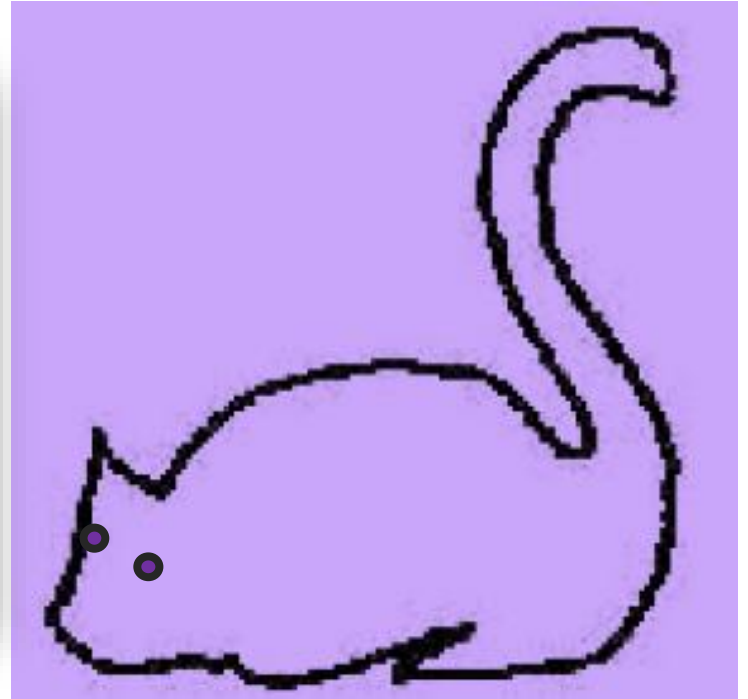
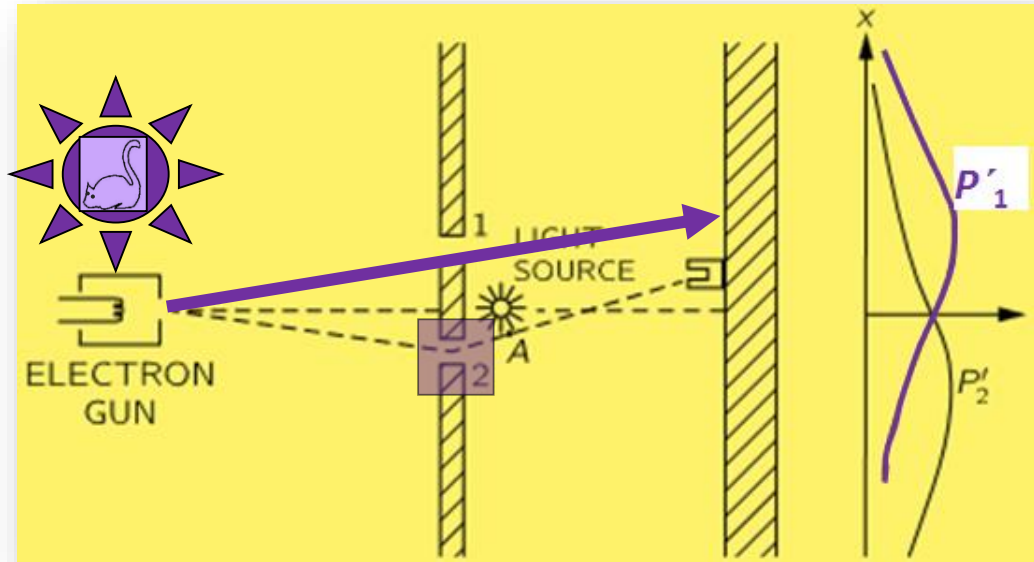




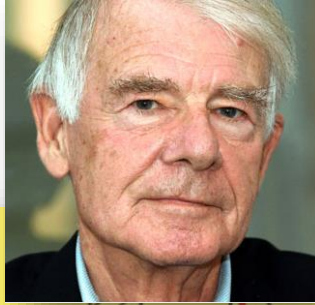


Information
=
Emergence of
newness (nature &
mind)

World 1



World 2

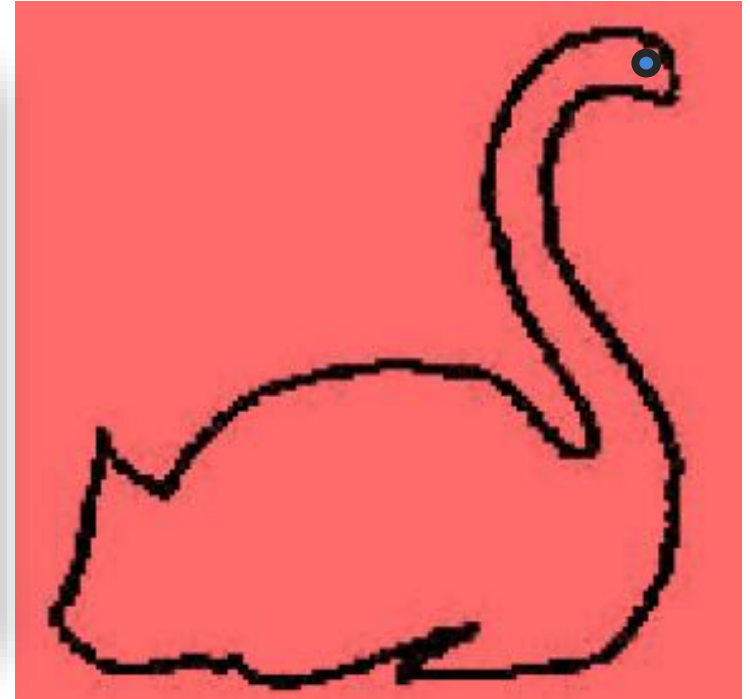
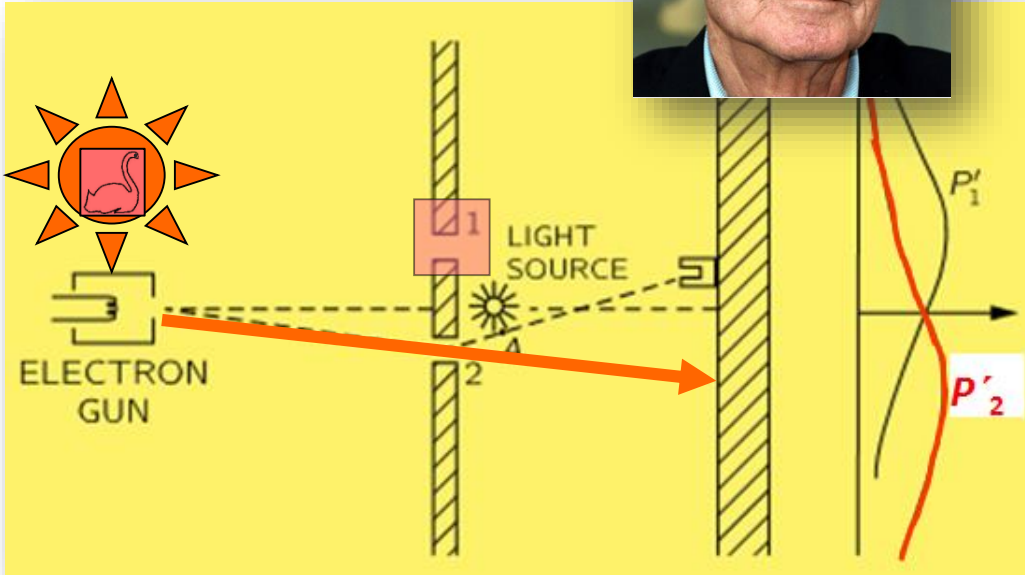


Wolf Singer, German neuroscientist (2013):

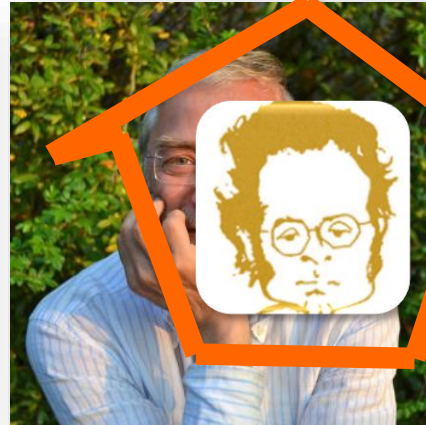
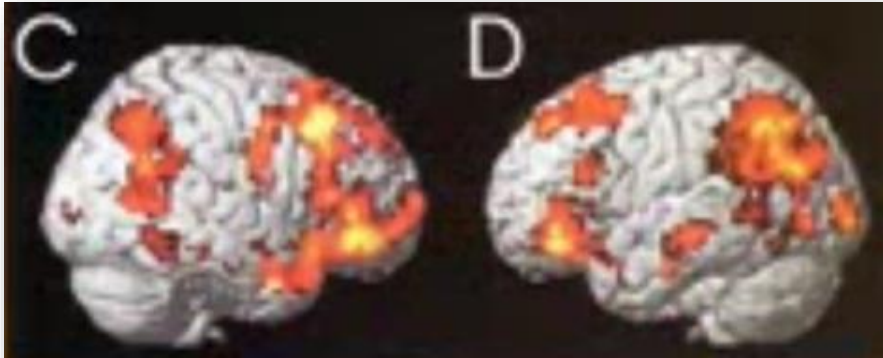
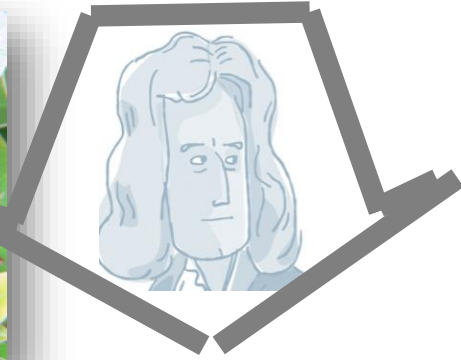
Conscious experience arises if **information** is bound together into a coherent, all-encompassing, non-local but distributed meta-representation.

The brain is by no means a stimulus driven, but a self-active system.

-> concept of Oscillation



- Self-active, “deep” emergence of new structure, “bound information” -> conscious meta-representation, self-active system
- Connectedness to bodily oscillation (Seth Lloyd: oscillating smell detection)

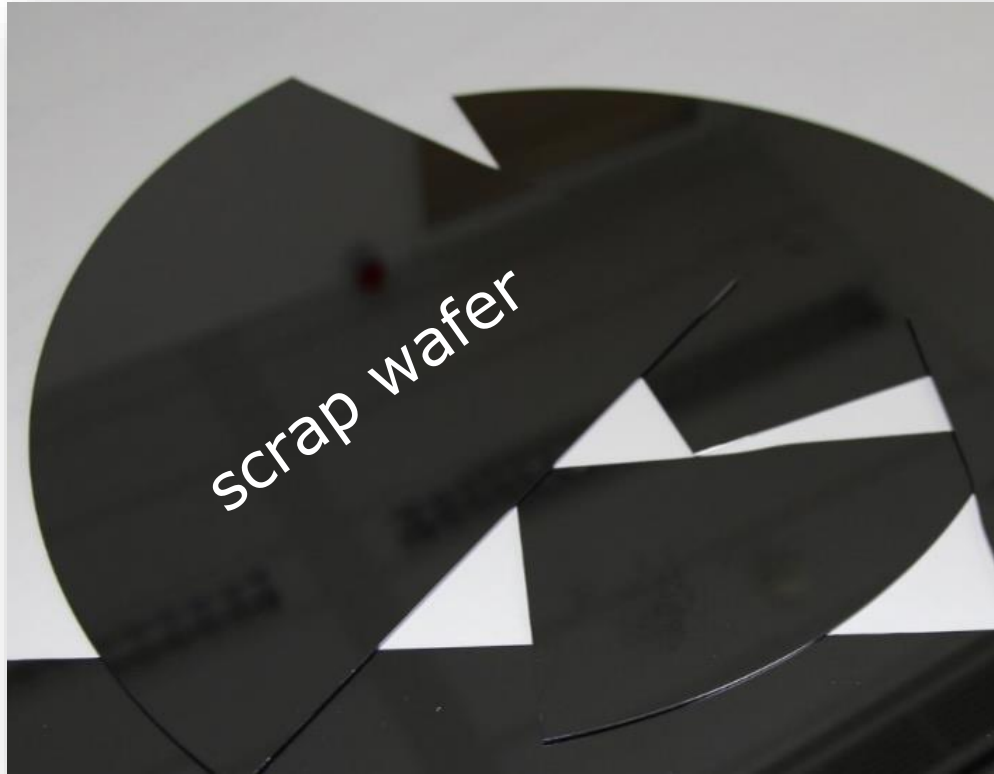


Gerald Hüther,
co-author,
plasticity of the brain

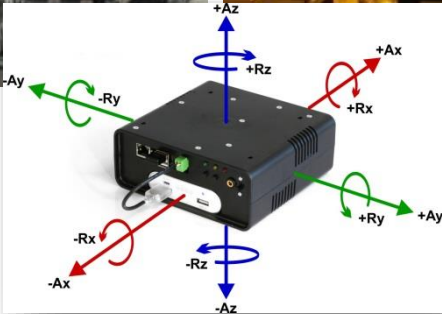
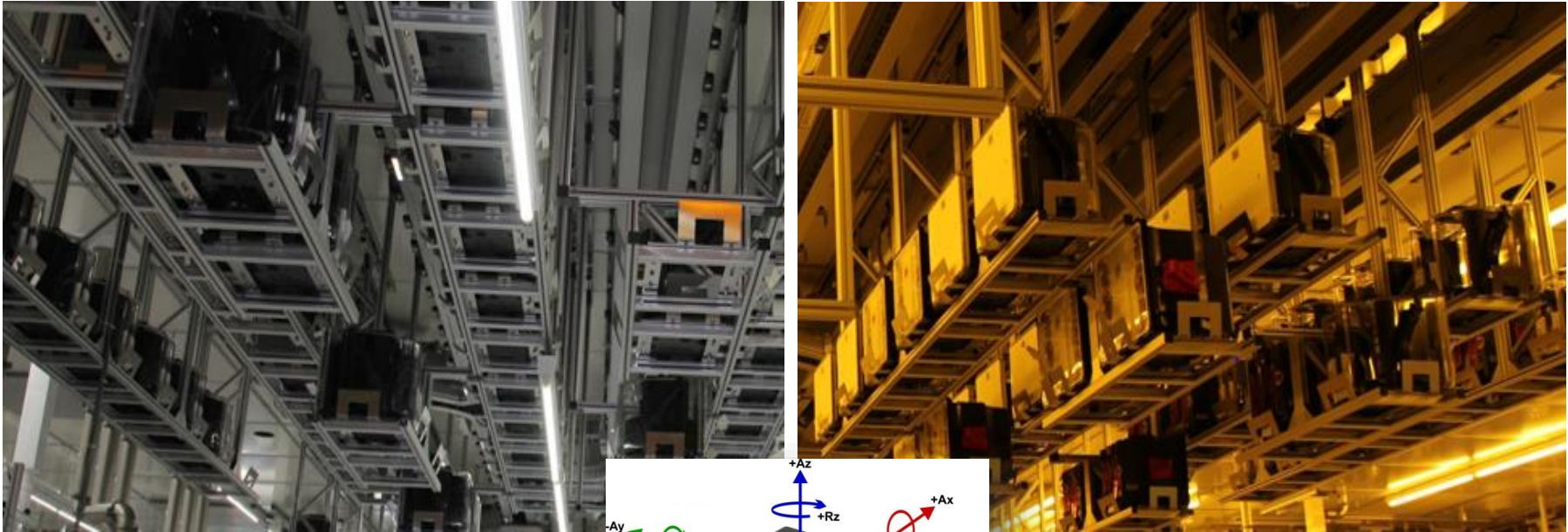
3. A day in a life of an engineer

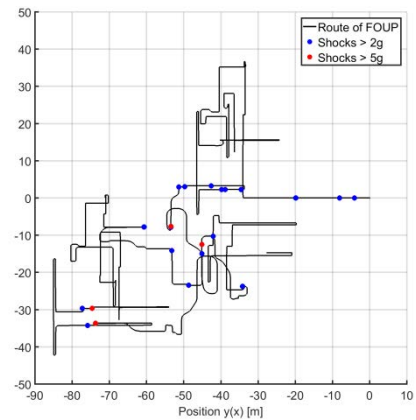
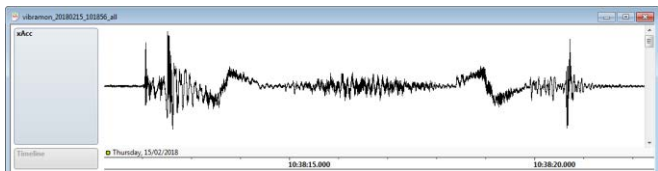
Thin wafers:

- rethink production



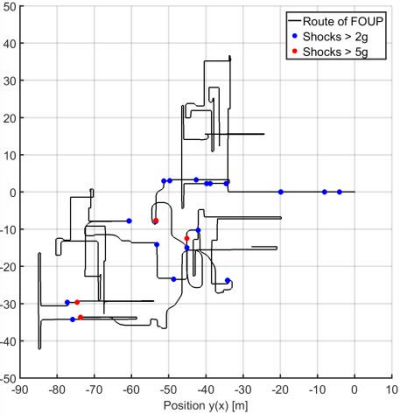
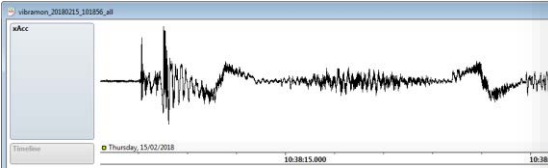
Searching for the problem source





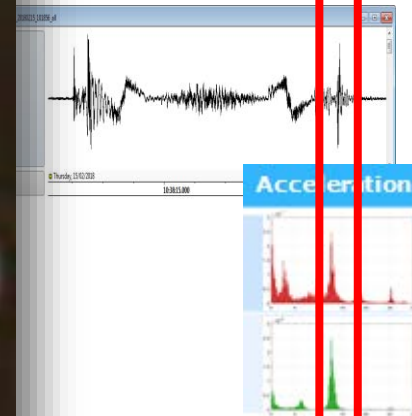
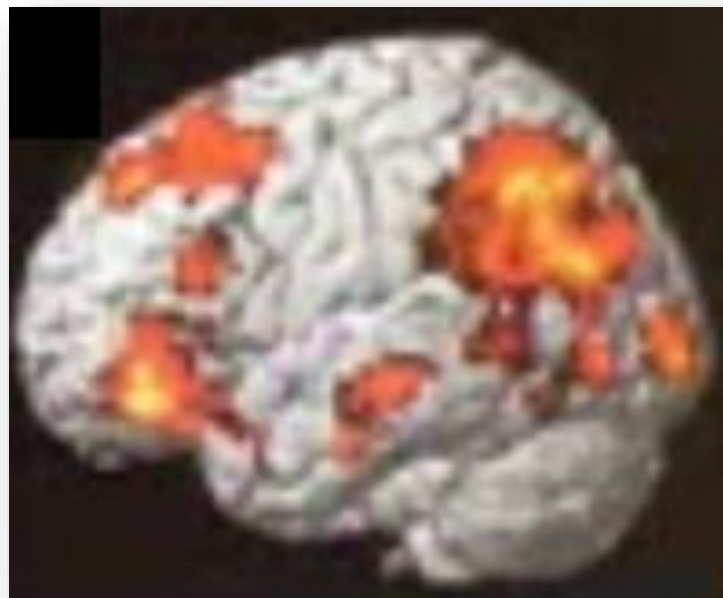
Axis / Signal	Acceleration	Rotation
x-Axis (xAcc, xRot)		
y-Axis (yAcc, yRot)		

The problem: too much data

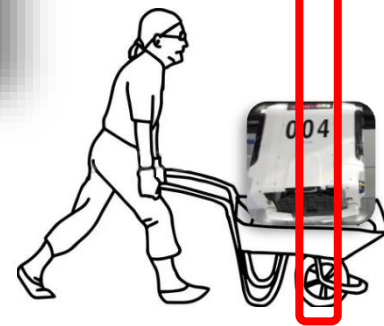
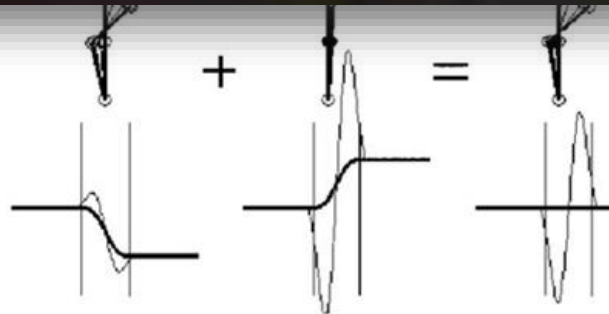


Axis / Signal	Acceleration	Rotation
x-Axis (xAcc, xRot)		
y-Axis (yAcc, yRot)		

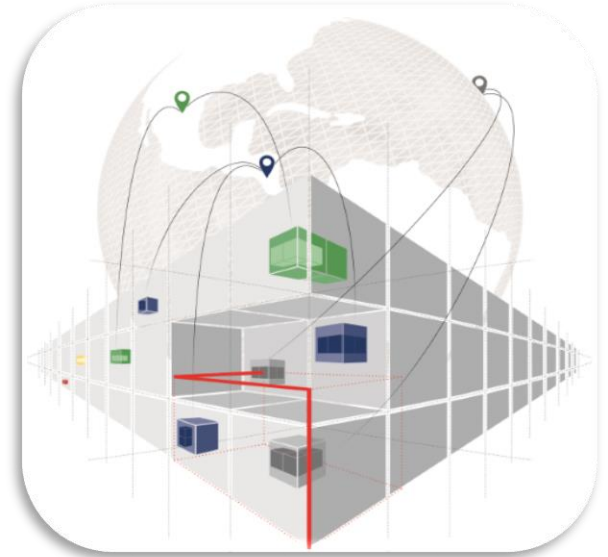
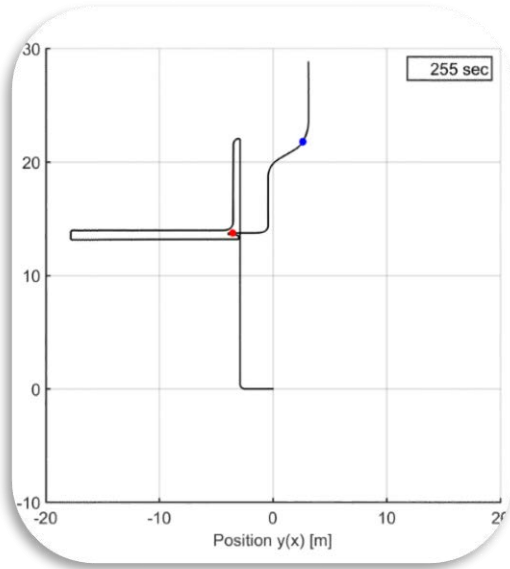
Bodily experienced, phenomenal (implicit) knowledge: Oscillations



- New phenomenon: new, complex physical model
- Multi-dimensional causal relationships
- Phenomenon (idea) comes first!



Solution – holistic state space of manufacturing



Goal:

- More data & immediate transform to information
- The right kind of information -> state space of manufacturing



Neuro-Physics of knowledge

data



imagination



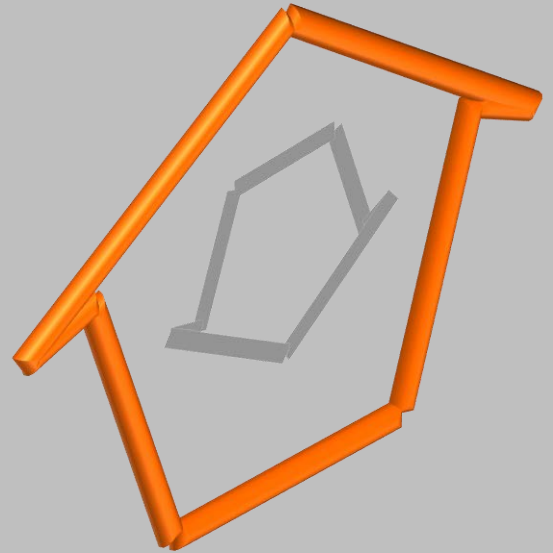
information

- Deterministic worldview does not cover emergence of new phenomena
- “Deep knowledge” composes of real-valued causality & imaginary-valued potentiality
- Non-deterministic self-activity is primary -> places human knowledge and expertise into the foreground
- DNN’s may support search for new phenomena

Summary:

Further acceptance of the deepness of knowledge

Methodological support required to enable success of DNN’s



Thank You!

